National Climatic Data Center

DATA DOCUMENTATION

FOR

DATASET 9938 (DSI-9938)

Polar Ice

September 16, 2003

National Climatic Data Center
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1. Abstract: Polar Ice is digital data set DS-9938, archived at the National Climatic Data Center (NCDC). It is also available as a CD-ROM. It is a joint NCDC, US Navy, and National Ice Center (NIC) product. DS-9938 contains weekly ice data in the "International Sea Ice in the Digital Form" (SIGRID) format for 1972-1994 for the Arctic and 1973-1994 for the Antarctic. The SIGRID format was designed to meet the sea ice requirements of large scale climate and statistical studies. The .25 degree grid structure includes total ice concentration, thickness stage, and form of ice for the complete period of record. The CD-ROM contains no display or extraction routines. The SIGRID reference file provides detailed information concerning the coding system for digitizing sea ice chart data. Files are in DOS format, but can be converted to UNIX.

2. Element Names and Definitions:

Header File

Layout

The DS-name of the file should be "SIGRIDINF." The header file should contain all information relevant to a set of uniform ice charts from the dame ice services using the same grid. Any changes in grid, grid area of parameters should be preceded by a new header file. The header file contains the following information:

- Type of information identifier (SIGRID)
- Originating country
- Originating Service
- Meshwidth of grid
- Starting point of grid
- Size of gridded area
- Total number and types of parameters included

Further should any information pertinent to the whole tape be included. This may refer to new parameters in which case they should be clearly defined as well as any other deviation from the coding procedures internationally agreed upon. The header file may also contain information on control procedures used and any other background information facilitating the use of the data. The header file should always include information on the maximum number of grid lines, grid points and parameters than can occur in any one chart on the tape. This will allow for the appropriate space to be allocated in the computer. The record length should be 80 characters.

Chart Data File

Layout

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The DS-name of this file should be "SIGRIDNN," where NN is the sequential number of file starting from 01. This file contains all information relevant to the individual ice charts and is divided into three records as follows:

- Reader record
- Grid line record
- Data group records

Header Record

Contains all information required for the identification of the chart:

- Date and time
- Serial number of chart
- Number and types of parameters included

Grid Line Record

This record contains information necessary for the identification of the information in grid points lying on the same grid line:

- Start of grid line indicator
- Configuration of grid area (longitude/latitude ratio)
- Coordinates of starting point of grid line
- Number of grid points along grid line

Record of Data Groups

The record of a data group will contain the actual sea ice information for each grid point as read from the chart. It will contain:

- Start of data group indicator
- Grid subdivision indicator (if required)
- Indicator for number of following consecutive points for which identical data is repeated (if required)
- Ice parameters

Coding Procedures

General

All information is coded for easy identification of all background information, as well as all data for the digitized ice charts. One exception is the possibility of including plain language information on the header file
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for additional information. This plain language information should follow after the coded information.

Header File SIGRINF

:AAFcFcNNN

(:AQcLaLaLaLaLoLoLoLoLo :Bn_n_n_n_n-n:Cd2d2d2d2)

:DNtNtPtPt...PtPt

Chart Data File (SIGRIDNN)

Header Record :*EJJJMMYYGGGpGp:FNsNsNs*

:*GNpNpP2P2:HP=P=NpNn*

Grid Line Record:*KZZ:Lmmmppp:MNpNpNp*

Data Group :*NGIRNrNrP2P2*

Specification of Symbolic Letters

In this report the symbolic letters are typed in *italics*: letters used as indicators on the tape record are printed in normal letter style. The following specifications of identifiers and symbolic letters are given in the order in which they appear in the record.

SIGRIDINF - identifier of header file

: - start of a new information group

AA - area or country from which the data originate (See WMO Pub No. 365, Part 11, Attachment 11-6, Table 8)

FcFc - Centre, Service or institution from which the data originate (table to be established)

NN - Catalogue number of grid used (See WMO Pub. No. 9, Volume 3). If the grid specification is not included in this publication, the grid can be defined by the following groups identified by the letters A, B and C. Use in this case NN = 099

( ) - If the grid is specified by means of a WMO catalogue number, groups within parentheses are omitted.

A B C ...R - indicators

QcLaLaLaLaLoLoLoLoLo - latitude and longitude of origo (starting point) of a geographical grid. The grid lines are scanned towards increasing latitudes

:

:

(south to north in the Northern Hemisphere and north to south in the Southern). The grid points are scanned from west to east along grid lines (applies to the Southern as well as the Northern Hemisphere)

nlnlnl - maximum number of grid lines (along meridian)

npnpnp - maximum number of grid points (along parallels)

dldldldl - mesh width of grid (distance between grid lines along meridians) in degrees and minutes.

NtNt - total number of sea ice parameters occurring on the charts

PtPt...PtPt - identifiers of all sea ice parameters occurring on the charts

SIGRIDNN - identifier of Chart Data File with sequential number (NN)

JJJ - century, decade and year (e.g. 982 = 1982)

MM - month of the year; from 01 to 12

YY - day of the month, from 01 to 31

GG - time of chart in whole hours, GMT

GpGp - period (+/- whole hours) of observations on which chart is based

NsNs - serial number of chart (determined by national centre)

NpNp - number of sea ice parameters included in each grid point without being separately identified in these points (see note 1).

PiPi...PiPi - identifiers of sea ice parameters and order in which they are included in each grid point without being separately identified in these points (see note 1).

PIPI - identifier of sea ice parameters defined individually for actual chart

Np - number of parameters defined by *PIPI*

Nn - number of digits per parameter defined by *PIPI*

= - sign that identifies the start of grid line record

ll - longitude/latitude mesh width ratio (example: distance between grid lines (N-S) 2 degrees, distance between grid points (E-W) 4 degrees, *ll* = 2).

mmmppp - coordinates of first grid point of a grid line, expressed as the number of grid points along the meridian (mmm) and along the parallel (ppp) counted from the origo (the origo has the coordinates 001001)

NpNpNp - number of grid points on grid line

: - start of data group indicator, used to separate data groups

GI - grid subdivision indicator (see Code table 14)

:

:

NrNr - number of consecutive grid points for which the identical information is repeated. (The RNrNr should not occur when the information only refers to one point). When, for instance RnrNr = RO2, the actual and the following point contain identical information.

PiPi - identifier of sea ice parameter within a data group. The data group may include one or several sea ice parameters all identified by PiPi, unless all grid points contain the same parameters in which case the parameters are identified in the Header Record (see Note 1).

Data Groups

Categories of Parameters

A data group consist of one or several sea ice parameters which correspond to a grid point. The parameters in a data group are representative for one mesh rectangle (for instance a geographical rectangle where the length along the parallels is 2 degrees and along the meridians 1 degree). the grid point is in the middle of the rectangle. The parameters are divided into nine main categories which contain one or several sub-elements.

The sea ice parameters are defined according to the new International System of Sea Ice Symbols. Each parameter is identified in the record by two letters, e.g. CT (total concentration of ice). The first letter identifies the category of the parameter while the second identifies parameters within the category. In the following tables the letters B,C,D,E,L,O,R,S,T and W are used as category indicators; the rest of the alphabet is left for future use.

The letters X, Y and Z are however reserved for use by individual services should they wish to include parameters not contained in the internationally agreed list. The X, Y, and Z may be used together with any other letter of the alphabet. The use of X, Y, Z should be clearly explained in the Tape Header File at the beginning of each tape. The number of parameters defined in the following tables is 53.

The following categories are proposed for general use:

Category Indicator	Elements
c	Concentration, stage of development and form of ice (including strips and patches)
D	Dynamic processes
v	Water openings
R	Topography features
E	Thickness of ice
s	Surface features and melting forms
B	Ice bergs or ice of land origin

:
:

T Sea surface temperature

0 Source of information on which chart is based

L Land area

Identification of parameters within a data group

In order to identify unambiguously a parameter within a data group, each parameter is defined by an identifier. The identifier can be used in the header record to define the parameter or parameters and the order in which they appear at each grid point. The identification of parameters in the header record shall be used when they occur at all or most of the grid points. Parameters not occurring at most of the grid points could preferably be identified at each grid point.

It should be noted that the recording of parameters on a tape record is less subject to space restrictions as are their coding for telecommunicated reports or plotting in the form of symbols on a sea ice chart. For archiving purposes, there is a greater freedom of choice of the number of digits to be used to record a parameter; this facilitates later processing of the data. Thus, for the recording of for instance, sea ice concentration, two digits are proposed.

The following parameter identifiers are defined:

- Concentration
- Stage of development
- Form of ice

According to the New International System of Sea Ice Symbols, seven cases need to be distinguished:

1. CT- Total concentration, *CC* (code table 1)
2. CA - Partial concentration, stage of development (or thickness) and form of thickest ice *CaCaSaSaFaFa* (code tables 1, 2 and 3)
3. CB - Partial concentration, stage of development, and form of second thickest ce,*CbCbSbSbFbFb* (code tables 1, 2 and 3)
4. CC - Partial concentration, stage of development and form of third thickest ice, *cCcScScFcFc* (code tables 1, 2 and 3)
5. CF - Predominant *FpFp* and secondary*FsFs* form of ice (code table 3)
6. CN - Stage of development of ice thicker than reported by *SaSc*, but with a concentration less than 1/10, *SoSo* (code table 2)
7. CD - Stage of development of any remaining class of ice, *SdSd*, not reported under CA, CB or CC (code table 2); note that no concentration or form of ice is reported for *SoSo* and *SdSd*

Coding: CT*CC* CA*CaCaSaSaFaFa* CB*CbCbSbSbFbFb*

:

CC*CcCcScScFcFc* (CF*FpFpFsFs*) CN*SoSo* CD*SdSd*

Dynamic Processes

DP- Dynamic processes *dp* (code table 4)
DD - Direction of dynamic processes,*D*(code table: 5)
DR - Rate of ice drift in tenths of knots (*ViVi*).
DO - Source of information, *Op* (code table 14)
Coding: - DP*dp* DD*D* DR*ViVi* DO*Op*

Water Openings

WF - Form of water openings, *Wj* (code table 6)
WN - Number of water openings, *No* (code table 7)
WD - Orientation (direction) of water openings, *D* (code table 5)
WW - Width of water openings, *WwWw* (in hundreds of meters)
WO - Source of information, *Op* (code table 14)
Coding: WF*Wf* WD*D* WW*WwWw* WN*No* WO*Op*

Topography Features (Ridges and Rafting)

RN - Nature of topography feature, *Rn* (code table 8)
RA - Age of topography feature, *Ra* (code table 9)
RD - Orientation of topography feature, *D* (code table 5)
RC - Concentration of topography feature, *CrCr* (code table 1)
RF - Frequency of topography feature, *RfRf* (number per nautical mile)
RH - Height (mean) of topography feature, *RhRh* in tenths of meters
RO - Source of information, *Op* (code table 14)
RX - Maximum height of topography feature, *RxRx* in tenths of meters
Coding: RN*Rn* RA*Ra* RD*D* RC*CrCr* RF*RfRf*
RH*RhRh* RX*R=R=* RO*Op*

*Drift of icebergs to be reported under "Icebergs or ice of land origin"

Thickness of Ice

EM - Mean thickness of level ice in cm, *tEtEtE*
EX - Maximum thickness of level ice in cm, *TxTxTx*

To indicate whether the thickness is estimated or measured, the following convention may be used:

- last digit of *tEtEtE* T=T=T= is 0 or 5: estimated
- last digit is any other number: measured

  EI - Thickness interval, *tntntnt=t=t=*
- *tntntn* = lower limit in centimeters
- *t=t=t=* = upper limit in centimeters

EX 35 - 50 EIO35050 (*tntntn* = 35 cm, *t=t=t=* = 50 cm)
EO - Source of information, *Op* (code table 14)
Coding: EM *tEtEtE* X*t=t=t=*EI*tntntnt=t=t=*EO*Op*

Surface features and melting forms

SC - Concentration of snow (areal coverage) in tenths, *CsCs*
SN - Snow depth, *s* (code table 10)
SD - Orientation (direction) of sastrugies, *D*(code table 5)
SM - Melting forms, *ms* (code table 11)
SA - Area coverage of water on ice in tenths, *mcmc*
SO - Source of information, *Op* (code table 14)
Coding: SC*CsCs* Sn*s* SD*D* SM*ms* SA*mama* SO*OP*

Icebergs or ice of land origin

BL - type of iceberg, B*i*B*s* (code table 12)
BD - direction of drift of iceberg, *D* (code table 5)
BE - rate of drift in tenths of knots, *ViVi*
BN - number of icebergs, nBnB (code table 13)
BY - day of month (*YY*) when iceberg(s) was (were) sighted
BO - source of information, *Op* (code table 14)
Coding: BL*BiBs* BD*D* BR*ViVi* BN*nBnB* BY*YY* BO*Op*

Sea surface temperature

TT - sea surface temperature in tenths of degrees, TwTwTw
TO - source of information, *Op* (code table 14)
Coding: TT*TwTwTw* TO*Op*

Note: If the temperature is negative, the first digit should be coded by a minus sign.

Source of information

OP - primary source of information on which the chart is based, *Op* (code table 14)
OS - secondary source of information on which the chart is based, *Os* (code table 14)
OT - tertiary source of information on which the chart is based, *Ot* (code table 14)
Coding: OP*Op* OS*Os* OT*Ot*

Land area

LL - grid point over land A list of parameter identifiers and parameters is given in Annex 1 and a list of parameters with definitions in Annex 2. Code tables are given in Annex 3

The Grid

General

Provision is only made for one type of grid, the geographical. This in order to facilitate the compilation of data from different centers, which cover over-lapping geographical areas. The following definitions are used in this report:

Grid Line: Line connecting all grid points having the same latitude

Grid Point: A point in the middle of a square or rectangle where the dimension corresponds to the mesh width along parallels and meridians. The distance between the grid points corresponds to the above mesh width. The ice

:
:

information for a grid point is representative for the grid square in which the grid point lies.

Data Group: Group which contains information on one or several ice parameters relative to one grid point (or several consecutive grid points with identical information on a grid line).

Mesh Width: The length of the sides of the rectangles, in the middle of which the grid point lies. The sides of the rectangle will in most cases have different lengths in a geographical grid (e.g. 2 degrees along parallels and 1 degree along meridians).

Scanning Mode: the order in which the grid points are scanned. In a geographical grid the grid points are scanned along grid lines from west to east (0 to 360 degrees). The grid lines are scanned towards increasing latitudes (south to north in the Northern Hemisphere and north to south in the Southern).

Positioning of the Grid

A grid will consist of a number of sequential grid lines along which lie a number of sequential grid points. An example of a geographical grid is given in figure 3. The grid covers an area from 67 degrees N to 83 degrees N and 33 degrees W to 40 degrees E corresponding to the Norwegian ice chart shown in figure 4. The grid squares have a mesh width of 2 degrees Long. X 1 degree Lat from 67 degrees N to 75 degrees N and 4 degrees Long. X 1 degree Lat. from 76 degrees N to 83 degrees N. The origo is placed in the lower left corner. The grid lines are numbered and scanned from south to north and the grid points from west to east. When digitizing a chart, the "coordinates" of the first point on each grid line shall be given, e.g. 008007. This would mean that the first point on grid line 008 to be scanned is No. 007. This point is marked with x in figure 3.

To identify a grid the following information is needed:

- the coordinates of the origo
- the mesh width (grid distance) along meridians which is constant for each chart
- the longitude/latitude ratio for each grid line (this will allow the ratio long/lat to be changed when moving along the meridians)

The following ratio (Long/Lat) is recommended:

Latitude intervals	Long/Lat	Mesh width along parallels if mesh width along meridians is 60 nm (1 degree lat)
00 - 50	1	60 nm - 39 nm
50 - 75	2	77 nm - 31 nm
75 - 80	4	52 nm - 42 nm
80 - 85	6	63 nm - 31 nm

:
:

85 - 87	12	63 nm - 38 nm
87 - 89	20	63 nm - 21 nm
89 - 895	40	42 nm - 21 nm
895 - 90	80	42 nm

Variation of Grid Resolution

The information contained in an ice chart will generally not be evenly distributed. Over large areas the conditions may be fairly uniform and a course grid may suffice here. In other areas more detailed information may be shown, especially along coast lines and along the ice edges. A more detailed recording of information in such limited areas without having to use a fine grid for the entire chart is made by the insertion of local subdivisions of the grid. The subdivision is then indicated by a "subdivision indicator."

Three levels of subdivisions have been provided for, with a view to dividing the original grid square into four, nine or 16 areas according to figure 2. The basic grid may be defined as "first order" and the following finer meshes as second, third and fourth respectively. The number of sub-areas for each of these orders will be 12 =1, 22 =4, 32 =9 and 42 =16.

Example: a geographical grid has a basic mesh width of 1 latitude by 2 longitude; the second order will have 4 grid squares with a mesh width of 1/2 latitude by 1 longitude, the third order 9 grid squares with a mesh width of 1/3 latitude by 2/3 longitude, and the fourth order 16 grid squares with a mesh width of 1/4 latitude by 1/2 longitude. Expressed in degrees and minutes this would be 1 x 2, 30'x 1, 20' x 40', and 15' x 30'. The grid subdivision is indicated by a subdivision indicator which for the basic grid is set to 1, second order to 2, third order to 3 and fourth order to 4.

<table>
<tr><th>Basic Grid (first order)</th><th colspan="2">Second order subdivision</th><th colspan="3">Third order subdivision</th><th colspan="4">Fourth order subdivision</th></tr>
<tr><td rowspan="4">1</td><td rowspan="2">3</td><td rowspan="2">4</td><td>7</td><td>8</td><td>9</td><td>13</td><td>14</td><td>15</td><td>16</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">5</td><td rowspan="2">6</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">2</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
</table>

Figure 2, Subdivision of a Grid Square

Examples

As an example of gridding and digitizing a sea ice chart, the Norwegian ice chart from 1 October 1979 was chosen. The mesh width of the grid is constant 1 degree along the meridians and 2 degrees along the parallels south of 75 degrees N and 4 degrees north of 75 degrees N. The origo of the grid lies at

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67 degrees north, 33 degrees west. The grid is shown in figure 3. The sea ice information has only been digitized for two grid lines 009 and 010. In Example 1 each parameter is identified at each grid point, while in Example 2 the parameter CT (total concentration of ice) is defined in the Header Record and identified at each grid point by its position.

Example 1. Digitized Norwegian Ice Chart of 1 February 1979

```
SIGRIDINF
:NOMI:099:A7670003300:B018036:C0100:D05CTCAWFWDTT
SIGRID01
:E97902011200:F009
=K02:L009007:M032
:R02CT92CA929908:RO3CT90:407CT80:N2CT80:CT402F6WD3
:CT00:CT60Wf6WD7:CT00:TT000:TT010:TT015:N2CT10:TT000:TT005
:CT40WF6WD7:CT50WF6WD7:RO3CT80:N2CT40:CT20WF6WD5:CT80:CT70
:CT30WF6WD1:R02 CT20WF6WD2:CT60WF6WD3:CT70:RC2CT90:R02CT80
=K04:L010004:M016
:CT92CA929908:R02CT90:CT90:CT80:CT60WF6WD3:CT0CTT005
:CT01TT005:N2CT0155005:CT40WF6WD4:CT60WF6WD7:CT00
:CT70WF6WD3:R02CT80:CT90:R04CT90
=k04:L011004:M016
:99:99:99
```

Example 2. Digitized Norwegian Ice Chart of 1 February 1979

```
 SIGRIDINF
 :NOMI:099:A7670003300:B018036:C0100:D05CTCAWFWDTT
 SIGRID01
 :E97902011200:F0009:G01CT
 =KD2:L009007:M032
 :R0292CA929908:R0390:R0780:N280:40WF6WD3:00:60WF6WD7:00
 :00TT000:00TT01000TT015:N210:00TT000:00TT005:40WF6WD7
 :50WF6WD7:R0380:N240:20WF6WD5:80:70:30WF6WD1:R0220WF6WD2
:
:
```

```
        :60WF6WD2:70:R0290:R0280
        =k04:L010004:M016
        :92CA929908:R0290:90:80:60WF6WD3:00TT005:01TT005:N201TT005
        :40WF6WD4:60WF6WD7:00:70WF6WD3:R0280:90:R0490
        =K04:L011004:M016
        :99:99:99
```

Explanation of the Code Figures

```
NO              = Norway
MI              = Meteorological Institute
099             = Geographical Grid with definitions
A7670003300     = Coordinates of origo (67 00' N, 3300' W)
B0018036        = Maximum number of grid lines (18) and maximum number
                  of grid points along grid line (36)
C0100           = Grid mesh (1 degree along meridians)
D05CTCAWFWDTT   = Total number of parameters digitized (5)
                  and identifiers of these parameters
E97902011200    = Date of chart (1 February 1979 12 GMT)
F009            = Serial number of chart (no 9/1979)
G01CT (example 2) = Number of parameters (1) and parameter
                     not identified in each grid point
=               = Start of grid line
K02             = Ratio between longitude and latitude
                  (2 long/1 lat)
L009007         = coordinates of starting point of grid line
M032            = number of grid points along grid line
:               = start of first data group

:
:
```

```
R02             = number of grid points for which the same data
                  apply (two grid points)
CT92 (example 1) = total concentration = 10/10
92 (example 2)  = total concentration = 10/10
CA92            = Partial concentration of thickest ice = 10/10
99              = stage of development of ice unknown
08              = form of ice = fast ice
:               = start of second data group (applies to third grid point)
R03             = number of grid points for which the same data
                  apply (three grid points)
CT90 (example 1) = total concentration = 9/10
90 (example 2)  = total concentration = 9/10
:               = start of third data group (sixth grid point)
RO7             = seven consecutive grid points are identical
CT80 (example 1)= total concentration = 8/10
80 (example 2)  = total concentration = 8/10
:               = start of fourth data group (thirteenth grid point)
N2              = grid square subdivided into four subsquares
CT80 (example 1)= total concentration in first subsquare = 8/10
80 (example 2)  = total concentration in first subsquare = 8/10
:               = start of fifth data group (subsquare 2)
CT40 (example 1)= total concentration = 4/10
40 (example 2)  = total concentration = 4/10
WF6             = form of water opening = ice edge (6)
WD3             = orientation of ice edge = SE - NE (3)
:               = start of sixth data group (subsquare_3)
CT00 (example 1)= open water
00 (example 2)  = open water
:               = start of seventh data group (subsquare 4)
:
:
```

CT60 (example 1)= total concentration = 6/10

60 (example 2) = total concentration = 6/10

WF6 = form of water opening = ice edge (6)

WD7 = orientation of ice edge = NW - SE (7)

: = start of eighth data group (fourteenth grid point)

CT00 (example 1)= open water

00 (example 2) = open water

: = start of ninth data group (fifteenth grid point)

00 (example 2) = open water

TT000 = sea surface temperature = 00.0 c

List of Parameter Identifiers and Parameters

Parameter Identifier	Parameter(s)	Number of Parameters	Digits per parameter	Total number of digits
CT	CC	1	2	2
CA	CaCaSaSaFaFa	3	2	6
CB	CbCbSbSbFbFb	3	2	6
CC	CcCcScScFcFc	3	2	6
CF	FpFpFsFs	2	2	4
CN	SoSo	1	2	2
CD	SdSd	1	2	2
DP	dp	1	1	1
DD	D	1	1	1
DR	ViVi	1	2	2
DO	Op	1	1	1

:
:

WF	Wf	1	1	1
WN	No	1	1	1
WD	D	1	1	1
WW	WwWw	1	2	2
WO	Op	1	1	1
RN	Rn	1	1	1
RA	Ra	1	1	1
RD	D	1	1	1
RC	CrCr	1	2	2
RF	RfRf	1	2	2
RH	RhRh	1	2	2
RO	Op	1	1	1
RX	RIRI	1	2	2
EM	tEtEtE	1	3	3
EX	txtxtx	1	3	3
EI	tntntntxtxtx	2	3	6
EO	Op	1	1	1
SC	CsCs	1	2	2
SN	s	1	1	1
SD	D	1	1	1
SM	ms	1	1	1

:
:

SA	mama	1	1	1
SO	Op	1	1	1
BL	BiBs	1	2	2
BD	D	1	1	1
BR	ViVi	1	2	2
BN	nBnB	1	2	2
BY	YY	1	2	2
BO	Op	1	1	1
TT	TwTwTw	1	3	3
TO	Op	1	1	1
OP	Op	1	1	1
OS	Os	1	1	1
OT	Ot	1	1	1
LL		0		0
Total: 46		53		88

List of Sea Ice Parameters

BiBs -type and size of iceberg (code table 12)

CC -total concentration of all ice in the area, reported in tenths (code table 1)

CaCa -Partial concentration of respectively thickest,

CbCb second thickest and third thickest ice, reported in

CcCc tenths (code table 1)

CrCr -concentration of topography features, in tenths (code table 1)

CsCs -concentration of snow coverage in tenths (code table 1)

D -1) Direction of dynamic processes (code table 5)

:

:

-2) Orientation of water openings (code table 5)

-3) Orientation of sastrugies (code table 5)

-4) Orientation of topography feature (code table 5)

Note: compacting of ice in for instance NE-SW direction is recorded either as 1 or 5

dp -dynamic processes (code table 4)

FaFa

FbFb

FcFc -form of ice corresponding to *SaSa*, *SbSb*, and*ScSc* respectively (code table 3)

FpFp - predominant (*FpFp)* and secondary (*FsFs*) form *FsFs* of ice (code table 3)

MaMa -area coverage of melt water in tenths

Ms -melting forms (code table 11)

No -number of water openings (code table 7)

nBnB -number of icebergs (code table 13) (WMO code 2877)

Op -Observational method for individual parameters (code table 14)

Op -primary *(Op)*, secondary (*Os*) and tertiary (*Ot)*

Os source of observation on which the ice chart is

Ot based (code table 14)

Ea -age of topography feature (code table 9)

RfRf -frequency of topography feature, in number per nautical mile

EhEh -mean height of topography feature, in tenths of meters

RxRx -maximum height of topography feature, in tenths of meters

Rn -nature of topography feature (code table 8)

SaSa -stage of development of respectively thickest,

SbSb second thickest and third thickest ice, of which

ScSc the concentration is reported by *CaCa*, *CbCb* and *CcCc* respectively (code table 2)

SdSd -stage of development of any remaining class of ice not reported by *SaSa*, *SbSb*, *ScSc* or *SoSo* (code table 2)

:

SoSo -stage of development of ice thicker than *SaSa* but with a concentration less than 1/10 (code table 2)

s -snow depth (code table 10) (WMO code)

TwTwTw -sea surface temperature, in tenths of degrees

tEtEtE -mean thickness of ice in centimeters

tntntn -minimum thickness in thickness interval

txtxtx -maximum thickness of ice, in centimeters

ViVi -rate of ice drift, in tenths of knots

Wf -form of water openings (code table 6)

WwWw -width of water openings, in hundreds of meters

YY -day of month when icebergs were sighted

Code Tables

Code Table 1 - Concentration (*CC*, *CaCa*, *CbCb*, *CcCc*, *CrCr*, *CsCs*)

	Code Figure
Ice free	00
Less than 1/10 (open water)	01
Bergy water	02
1/10	10
2/10	20
.	.
.	.
.	.
9/10	90
more than 9/10 less than 10/10 (9+)	91
10/10	92
concentration intervals	ClCh

(Cl = lowest concentration in interval)

Ch = highest concentration in interval)

Examples:

1/10 - 3/10	13
4/10 - 6/10	46

:
:

7/10 - 9/10	79
7/10 - 10/10	71
Unknown	99

Code Table 2 - Thickness of ice or stage of development (*SaSa*, *SbSb*, *ScSc*, *SdSd*, *SoSo)*

		Code Figure
Ice free		00
Ice thickness in cm		01
		.
		.
		50
	55 cm	51
	60 cm	52
	65 cm	53
	70 cm	54
thickness	80 cm	56
interval, 5 cm	85	57
	90	58
	95	59
----------	100	60
	110	61
	120	62
	130	63
thickness	140	64
interval 10 cm	150	65
	160	66
	170	67
	180	68
	190	69

:
:

----------200		70
thickness 250		71
interval 50 cm 300		72
350		73
----------400		74
thickness 500		75
interval, 600		76
100 cm 700		77
800		78
----------900		79
No stage of development		80
new ice		81
nilas, ice rind	less than 10 cm	82
young ice	10 - 30 cm	83
gray ice	10 - 15 cm	84
gray-white ice	15 - 30 cm	85
first year ice	30 - 200 cm	86
thin first year ice	30 - 70 cm	87
thin first year stage 1	30 - 50 cm	88
thin first year stage 2	50 - 70 cm	89
for later use		90
medium first year ice	70 - 120 cm	91
for later use		92
thick first year ice	greater than 120 cm	93
for later use		94
old ice		95
second year ice		96
multiyear ice		97
glacier ice		98

:
:

undetermined/unknown	99

Code Table 3 - Form of ice (*FaFa, FbFb, FcFc, FpFp, FsFs*)

		Code Figure
Pancake ice	30 mm -3 m	00
Shuga/small ice cake, brash ice less than 2 m across		01
Ice cake	less than 20 m across	02
Small floe	20 m - 100 m	03
Medium floe	100 m - 500 m	04
Big floe	500 m - 2 km	05
Vast floe	2 km - 10 km	06
Giant floe	greater than 10 km across	07
Fast ice		08
Growlers, floebergs or floebits		09
Icebergs		10
Strips and patches		11
Level ice		12
Undetermined or unknown		99

Code Table 4 - Dynamic processes (dp)

	Code Figure
Compacting ice, no intensity given	0
Compacting ice, slight	1
Compacting ice, considerable	2
Compacting ice, strong	3
Diverging ice	4
Shearing ice	5
Ice drift, rate 0,1 - 0,9 knots	6
Ice drift, rate 1,0 - 1,9 knots	7

:

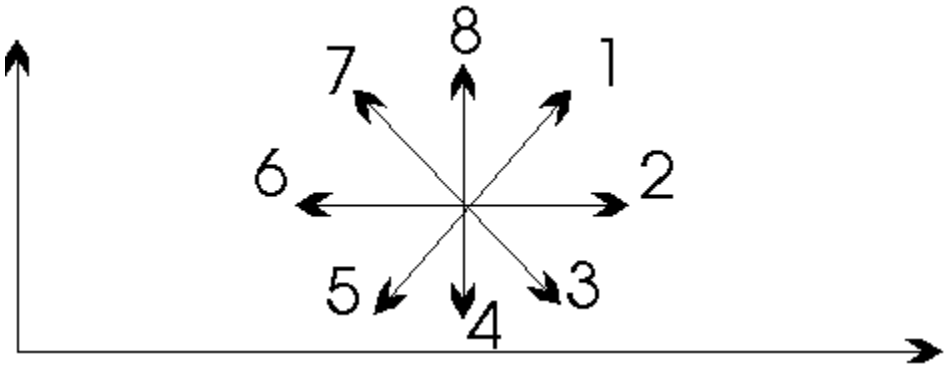
:

Ice drift, rate 2,0 - 2,9 knots	8
Ice drift, rate 3,0 knots or more	9

Note: When actual rates of ice drive (*ViVi*) are given, code figure *ViVi* = 99 is used for rate unknown

---

Code Table 5 - Direction indicator (D) (see WMO code 0700)



The direction is identified in relation to the grid. In a geographical grid, 1 would indicate northeast, 2 east, 3 southeast, etc.

Code Table 6 - Form of water opening (*Wf*)

	Code Figure
cracks	1
crack at specific location	2
lead	3
frozen lead	4
polynia	5
ice edge	6

Code Table 7 - Number of water openings (*No*)

	Code Figure
1	1
2	2
3 - 5	3
:	
:	

5 - 10	4
> 10	5

Code Table 8 - Nature of topography feature (deformation) (*Rn)*

	Code Figure
rafting	1
hummocks	2
ridges	3
jammed brash barrier	4

Code Table 9 - Age of topography feature (*Ra*)

	Code Figure
New	1
weathered	2
very weathered	3
aged	4
consolidated	5

Code Table 10 - Snow depth (*s*) (see WMO code)

Code Table 11 - Melting forms (*ms*)

	Code Figure		Code Figure
no melt	0	many thaw holes	5
few puddles	1	dried ice	6
flooded ice	3	rotten ice	7
few thaw holes	4	few frozen puddles	8
		all frozen puddles	9

Code Table 12 - Ice of land origin (*BiBs*)

Type (*Bi*) Code Figure Size (*Bs*) Code Figure

growler and/or
:
:

bergy bit	1	unspecified	0
iceberg unspecified	2	small	1
iceberg, glacier berg	3	medium	2
iceberg, dome	4	large	3
iceberg, pinnacled	5	very large	4
iceberg, tabular	6		
ice island	7		
floeberg	8		
radar target (suspected iceberg)	9		

Code Table 13 - Number of icebergs (nBnB) (see WMO code 2877)

Code Table 14 - Observational methods *(Op, Os, Ot)*

	Code Figure
visual surface observation	1
visual aircraft observation	2
visual and infrared satellite observation	3
passive microwave satellite observation	4
radar surface or airborne observation	5
radar satellite observation (SAR)	6
laser/scatterometer/sonar	7
data buoys	8
estimated (temporal and/or spatial)	9
unknown	0

Code Table 15 - Grid subdivision indicator (*GI*)

	Code Figure

:
:

second order subdivision	(4 squares)	2
third order subdivision	(9 squares)	3
fourth order subdivision	(16 squares)	4

3. Start Date: 19720101

4. Stop Date: 19941231

5. Coverage:

a. Southernmost Latitude: -90.0S
b. Northernmost Latitude: 90.0N
c. Westernmost Longitude: -180.0W
d. Easternmost Longitude: 180.0E

6. How to Order Data:

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
E-mail: **NCDC.Orders@noaa.gov**

7. Archiving Data Center:

Archive Branch
National Climatic Data Center
151 Patton Avenue
Asheville, NC 28801

8. Technical Contact:

National Climatic Data Center
151 Patton Avenue
Asheville, NC 28801

9. Known Uncorrected Problems: None.

10. Quality Statement:

11. Essential Companion Datasets:

12. References:

Kukla, G.; Hecht, A.; Wiesnet, D. eds. (1981) SNOW WATCH 1980. Proceedings of the Workshop held 1-2 October 1980 in Washington, D.C. Boulder, CO World Data Center-A for Glaciology (Snow and Ice), Glaciological Data, Report GD-11, p. 71-77. (Godin Paper)

Kukla, G.; Hecht, A.; Wiesnet, D. eds. (1981) SNOW WATCH 1980. Proceedings of the Workshop held 1-2 October 1980 in Washington, D.C. Boulder, CO World Data Center-A for Glaciology (Snow and Ice), Glaciological Data, Report GD-11, p. 139-144. (Walsh Paper)

Kulka, G.; Robinson, D. (1979) Accuracy of snow and ice monitoring. Boulder, CO, World Data Center-A for Glaciology (Snow and Ice), Glaciology Data, Report GD-5. p. 91-97.

Thompson T Unpublished. Proposed format for gridded sea ice information (SIGRID). (Report prepared for the World Climate Programme, 1981)